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Some of the members of the Entomological Society of Ontario and affiliated Branch Societies have expressed regret that the Canadian Entomologist has not printed of late more articles of general interest to economic workers and amateur entomologists and that there has been a trend towards printing more papers of a systematic or taxonomic nature which are of interest only to specialists. This trend has been due not to any fault of the editor who has always welcomed papers of general interest, but rather to the membership and contributors who have failed to furnish material. This year an effort is being made to stimulate more interest in the Society and its publication, and the first step in this direction is the appointment of an Assistant Editor for the Canadian Entomologist. Dr. A. D. Baker of the Entomological Branch, Ottawa, has kindly accepted this position and will endeavour to collect material such as records of meetings both in Canada and the United States, notes on insect outbreaks, notes on collecting trips, items of personal interest, etc.

The success of this venture rests upon the membership at large and it is to be hoped that all members will cooperate and assist Dr. Baker in his work.

NESTING HABITS OF CERTAIN WESTERN BEES.

BY CHARLES H. HICKS,

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The nesting habits of many of our wild bees still remain unknown. Their importance, from an ecological as well as from an animal behavior standpoint, is great. Each species is adjusted to a set of environmental conditions which the kind and location of the nest helps to assure it. The young are protected from extremes of heat and moisture, as well as from parasites and predators by the materials composing the cell, by the manner of its construction and by the nesting site selected by the mother bee. The following account consists of brief notes on the habits of certain western species.

A few females of bees of the genus *Halictus* have been found under such conditions that it would seem they were hibernating during the winter in the adult stage. *H. ovaliceps* Ckll. (det. Timberlake) was observed digging in a clay bank at Pasadena, California on March 25, 1928. Three females were found, each in what appeared to be a separate nest or hibernaculum. One of these contained a cell (or a resting place) but at the time held no provisions. The tunnels of all the nests and the cavity of the one were smooth on the inside. The day on which the bees and their nests were taken was cloudy and dark. Each bee was deep within the tunnel with its head toward the outside. Specimens taken earlier in the year seemed to indicate, as did possibly one or more of these three, that this species hibernates as an adult female. A nesting *H. glabriventris* Cwfd. (det. Timberlake) was taken at Los Angeles on August 15. She was dug from a tunnel in fine sand,

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some three inches deep, where she was in the process of constructing a nest. It is not known if this species hibernates or not, as *H. ovaliceps* is believed to do.

Another species, the mature female of which is suspected of hibernating during the winter, is *H. arapahonum* Ckll. (det. Cockerell). This insect was found at Owens Lake, east of Boulder, Colorado on March 5, 1927. She was secured from a tunnel in the earth while I was digging for wasp and bee larvae. The bee, when found, was apparently inactive but as the day was fairly warm, soon responded feebly to stimuli when exposed to the sun. The tunnel of her nest extended straight into the earth for six inches; the bee was found in it and at a depth of four and one-half inches. At the very end of the shaft was a cavity which may have been a cell but which during the winter doubtless served as a resting place or a hibernaculum. When brought to the laboratory, the bee became very active in response to the increase in temperature. No other mature bees were found at this time (although only a few square feet were searched and that very shallowly) but many larvae of bees (*Spinoliella zebrata* Cr., and others) and of wasps (as for example, *Odynerus dorsalis* Fabr.) were obtained.

Tunnels in the earth may be used as "sleeping" quarters as well as for winter hibernation. This is the case in the species *Agapostemon femoratus* Cwfd. (det. Timberlake). A male was found at five o'clock in the afternoon at Universal City, near Los Angeles, California. He was hovering above a hole in the coarse sand of a vertical bank into which he entered at the first opportunity. When dug out this proved to be the entrance to a tunnel. The male was captured deep within but a female, also inside, flew away and eluded capture. The tunnel was four inches long, winding and horizontal with the surface of the bank. The date of observation and capture was July 29. Besides *Agapostemon,* males of *Augochlora, Anthophora* and *Bembex* (among wasps) have used tunnels in the earth as retreats and sleeping places during the night or on cloudy days.

The nest of a ground bee, *Melissoides timberlakii* Ckll. (det. Timberlake), was found at Long Beach, California on August 12, 1928. The large, pollen laden female was first seen entering a tunnel at the surface of the ground in an open, bare area. She remained out of sight for a short time while depositing the pollen in her cell. She was caught on leaving by means of a glass vial (which she hesitated in entering) placed over the entrance to the tunnel.

The diameter of the tunnel entrance measured some 6 mm. and had about it fine, excavated soil. The course of the tunnel was nearly straight into the earth for two and one-half inches; then it turned sharply to one side. A cell, vertical in position, was near this turn and contained a small amount of very dry pollen. The pollen carried on this last trip and possibly that of the two previous ones had had no nectar added to it. This finding is in conformity with that observed in some species where much or all of the pollen is collected and stored first and the nectar or honey added later. A suggested reason for this practise is that by leaving the more liquid provisions until last, rather than collecting it earlier, there is less time for the moistened contents to be exposed before the sealing of the cell with less danger of moisture loss, or of too great concentration of the sugar to be produced by such evaporation.

The unfinished cell and four completed ones were found to comprise the nest at this time. All were vertical in position. The short extension of the tunnel off the main shaft and leading to a given completed cell, had in each instance been filled with fine, loose soil. The cell itself was exceedingly smooth inside as though it had been glazed over with a substance which had made it quite impervious to water. Its size, although not measured, was larger than that of the bee and ample for holding the provisions of pollen and nectar. This moist mass of food filled the lower part of the oblong cell and was flat on top. The somewhat curved egg of the bee was placed above this where after hatching, the larva devoured the contents beneath it.

All the cells were at about the same level; namely, some three inches below the surface. This would indicate that they tend to radiate from the main shaft. The evidence is that the bee digs one main tunnel, then a short extension at right angle to it with a cell at the end. This cell is provisioned, an egg is placed on top of the food, the cell entrance is sealed and the short tunnel filled. Then the bee starts another and the sequence continues as described.

Leaf cutter bees of the genus *Megachile* may nest in the ground, in tunnels or cavities in wood, in abandoned or appropriated wasp cells or nests, or in other suitable places. Some species appear more fixed in their habits in respect to nest location than do others. A species that seems to prefer nesting in the ground is *Megachile* (*Xanthosarus*) *perihirta* Ckll. (det. Mitchell). Its nest was found at Los Angeles, California on June 25, 1929.

The bee was seen entering a tunnel in the sand at 8.15 a.m. with a load of pollen on her ventral scopa. This nesting site was at the south side of a high bank of nearly pure, fine sand which had been piled to one side of the Los Angeles River bed in changing its course near the First National Studios. The bee was working on the last cell of the nest and was not seen again after noon of that day. The tentative field identification of the bee was later verified from her reared offspring.

After waiting for more than three hours without a return of this insect on June 30, the nest was dug out. The entrance was roughly circular in outline, measured about 1.2 cm. across and opened into a large chamber from which two tunnels extended. The chamber probably had not been formed as a normal part of the nest, but had resulted from the fine nature of the sand which became loose and fell within while this bee and a *Bembex,* which had come earlier to begin her nest here but which she did not finish, were excavating.

The inner end of one of the tunnels containing four cells extended straight within for a distance of 21 cm. from the entrance and to a depth of 17.5 cm. from the surface. The other was at the right and 9 cm. from the opening and located 6.5 cm. below the surface. It led to a series of three cells. Each tunnel was but loosely and partially filled with sand. The longer one contained two pieces of a leaf, irregular in shape, in addition to the filler. The tunnels were not of the same diameter throughout, but measured somewhat more than that part in which the cells had been placed. These cells were formed, in accordance with the general habit of the Megachile, from oblong and circular pieces of leaves, cut with the jaws

of the bee from plants. The number and relationships of these parts were noted and recorded.

The circular pieces were placed at the ends of the cell, while the oblong ones formed the sides. The outer pieces of the latter were longer than the inner ones and overlapped a little the cell ahead. This had earlier formed a recess for the reception of the next cell to be constructed. Finally, it assisted in holding the cell together in a rod-like mass. In addition to the fact that the cell was firmly set into the end of the short, tight, leaf cylinder thus formed, it appeared that the bee had used some substance or secretion, especially on the sides, to hold the cut margins of the leaves together.

The number of discs at the anterior end of the 7 cells varied from 5 to 11, with an average of 6.28; the oblong pieces of the sides from 13 to 16, with an average of 15.28; the end pieces from 2 to 3, with an average of 2.42. It is interesting to note that the last cell to be constructed in each of the tunnels had anterior to it, a greater number (8 and 11 respectively) of plugs than did any of the others. This would conform with the greater need of protection at this point but may be due to the bee's instinct to fill the space at the end of the cell flush with the outer edge.

All the larvae had finished feeding at the time the nest was taken and five of them had completed their cocoons. Before the spinning of the cocoon, each bee larva had emptied its digestive tract of feces and had placed the then soft pellets rather evenly about the inner sides of the cell, with the exception of the anterior end which was nearly free from them. The cocoon was then formed, to which the excrement closely adhered, and which in the older cells had already become mouldy.

Two larvae, which had but recently finished feeding, each began cocoons the following day. One finished its cocoon, to outward appearance at least, in one day; the other spent nearly two days at the task. The second, from the lack of sufficient material to which to attach its cocoon, left a part of the upper end open, which permitted easier observation of its later transformations.

The silk of the cocoon of this bee is dense, tough, and dark brown in color. When completed, the thickness is such as to afford protection to the young within and to prevent light readily from penetrating the interior. The cocoons are long and of nearly equal width throughout, being flat across the anterior end and but slightly curved at the posterior. The length of five cocoons varied from 7.5 to 8.3, with an average of 7.95 mm. The number of pellets of excrement about the cocoons of two cells were 207 and 165 respectively.

A few days later, the sand to the sides of the former position of the main tunnel was explored with the result that two additional series of cells were found. One contained four cells and the other three. Each group was at the end of a short tunnel to the side of the common entrance and may have belonged to the nest of the same bee.

Not all bees of the genus *Megachile* form their cells from parts of leaves or flower petals. A few use resin to separate one cell from another in old beetle or other tunnels. These resin plugs and partitions keep out enemies and aid in maintaining suitable conditions within the cell. *M. angelarum* Ckll. (det. Timber-

lake) was seen about bettle tunnels in old, live oak stumps at Pasadena, California from June 20 to June 30 and the evidence secured at this time indicate that the species is a resin worker.

Some notes on the habits of the rare bee, *Exomalopsis torticornis* Ckll. (det. Cockerell), were taken on June 24, 1926 at Los Angeles, California. Four pollen laden females were seen, within a few minutes, entering a common nest entrance into the ground. Each came out, in turn, after depositing the provisions and was caught at that time. The nest was next dug out. The tunnel leading from the entrance was in very dry and in exceedingly hard soil. These conditions made it difficult to follow in digging, although I was able to trace its course for a few inches. It extended straight into the earth for one inch, then turned to one side for one and one-half inches where it again continued straight down for two inches. The continuation at this point was lost but not until it had been definitely shown that there was one tunnel and that all the bees were using it. The nests may or may not have been separate. This important point needs further investigation.

This species was described by Professor T. D. A. Cockerell from one male which I collected at the same locality where the nest and four females were found. The females were not handed to him for identification until after the description of the species, hence the omission from his paper.

Another rare bee, *Sphecodogastre texana* Cresson (det. Cockerell), was found on August 25, 1926 at White Rocks, near Boulder, Colorado, where it appeared to be nesting. When first seen, it was flying above the surface near my feet. Later, when I stepped back, it circled about a little mound of excavated sand for a few minutes, then entered a tunnel.

The nest was immediately dug out and was found to extend 40.5 cm. straight into the earth. This measurement did not include the height of the outer mound of sand about the orifice which increased the length by 3.5 cm. The tunnel was 5.5 mm. in diameter with very smooth inner walls. A side branch had been dug at the bottom, approximately the length of the bee, and into which it had crept and taken refuge. No pollen or nesting material had yet been carried below, a fact suggesting that this nest was in early stages of construction.

The persistence with which this bee endeavored to enter, even though disturbed, gives evidence that the nest was doubtless its own. Its actions were comparable to those of bees (such as *Megachile perihirta* Ckll.) and wasps (as *Aphilanthops quadrinotatus* Ashm.) found nesting, which continued flying about their nest in an attempt to enter, even though a person stood very near and troubled them.

The bee is thought to be active mainly in the evening or during cloudly weather since it possesses large ocelli possibly adapted to twilight vision. The weather, however, at the time the bee was observed and the nest taken, was clear and fairly bright. The early part of the day had been somewhat dark and cloudly and it may have been before the sky cleared that the bee started the flight afield that ended so fatally upon its return.

A female of *Panurginus piercei* Crfd. (det. Cockerell), was taken August 6, 1926 at Base Line Lake, near Boulder, Colorado in a drying crack in the earth where she appeared to be looking for a nesting place. Again on the 18th, another female was found at the end of a tunnel 4.5 cm. deep. This tunnel was being constructed at the time the bee was captured. It was not straight but gradually curved into the ground.

Many larvae of *Spinoliella zebrata* Cr. (det. Cockerell) were taken from their nests in the ground at Owens Lake, also near Boulder, during the winter of 1927, brought to the laboratory and the adults successfully reared. My only field observations were made at the same place on May 31, 1927 where several females were nesting in the soil. They were observed flying low over the surface, seeking a place to start a nest, were excavating or entering tunnels already begun. A number had dug at the edges of stones or other objects in the field. A week before, this territory had been carefully inspected but no bees of this species were abroad.

The cells are formed close to the surface and are very smooth inside. The short tunnels leading to them are loosely filled with soil after the cells have been completed and stored with food. A larva taken from its cell located 6 cm. deep on January 7, pupated March 9, was mature March 21 and dead by the 23rd. It was a male which had cast its pupal skin on the 19th and reached maturity two days later. It was kept, as were all the others I reared, at slightly above room temperature.

Another larva taken from a nest on January 7 from a cell 5.5 cm. deep, pupated February 27, cast its pupal skin March 4, and was a mature, active female March 7. This insect was typical in all respects with the exception that the yellow markings were not so deeply colored as they were in specimens found and collected in the field. This lighter degree of coloration has been noted in other species of the genus *Spinoliella* reared in the laboratory. It is not, however, generally evident in bees of the genus *Anthidium* and *Dianthidium* obtained under similar circumstances. The markings on reared specimens of *D. sayi* Ckll., from a study involving more than one hundred specimens, were found to closely approximate those found on field specimens.

The writer is pleased to express his thanks to Professors T. D. A. Cockerell, P. H. Timberlake, and T. B. Mitchell for their aid in determining the specimens considered in this account. He is grateful to Professor Norma LeVeque for reading the manuscript before its publication and for her helpful suggestions.

A NEW HAPLOPTILIA WITH NOTES ON TWO OTHER SPECIES* (LEPID).

BY J. McDUNNOUGH,

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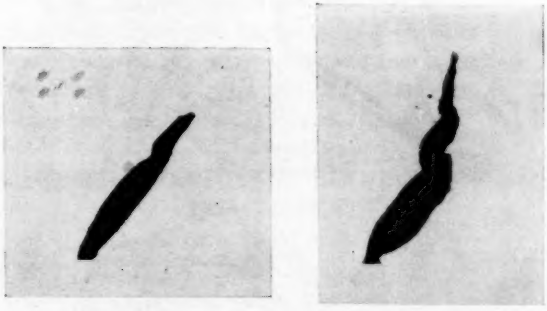
In the middle of June, 1934, while spending a few days at Annapolis Royal, N. S., I collected some *Haploptilia* cases of the *pruniella* type from the foliage of

*Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa.

Kalmia. Half a dozen or so of these cases were attached to the upper-side of the previous year's leaves; they were dull gray-brown in color and the apical portion was noticeably weather-worn as if the cases had hibernated; there was no sign that living larvae were within them as they remained perfectly quiescent on the leaves. A few other cases, found at the same time, showed evidence that living larvae were still within; these cases were brighter brown in color and appeared to have been more recently constructed as the apical portions showed clearly the smaller cases of one, and sometimes two, previous instars, attached in the usual holster-like manner to the much larger and broader basal portion. These latter larvae crawled about in the receptacle and fed slightly but soon in their turn became quiescent. The accompanying figures give some idea of the two forms of cases.

Moths emerged from June 26—July 3, as well as several parasites. As far as could be told, since unfortunately both types of cases were kept in the same breeding-tin, it was the presupposed hibernated cases that produced the adults, whilst the larvae in the newer cases either developed parasites or died, cases from which parasites emerged being readily recognized by the round hole in the side of the lower portion after emergence.



Larval cases of *Haploptilia kalmiella* n. sp.

The species is apparently rare as no further cases could be secured either in the vicinity of Annapolis or in other sections of the province visited, although the food-plant abounded.

Correspondence with Mr. C. Heinrich at Washington confirmed the conclusion that the species was undescribed. I therefore offer the following description of the adult:—

Haploptilia kalmiella n. sp.

Male. Palpi gray-brown outwardly, whitish at base and inwardly, with a well-defined gray tuft at apex of second joint ventrally, extending for half the length of the somewhat roughly scaled third joint. Antennae sharply annulate with deep brown and white, with a rather prominent dark gray-brown scale tuft from ventral area of basal joint. Head and thorax gray-brown. Primaries rather even shiny gray-brown with a slight, variably distinct tinge of ochreous (present

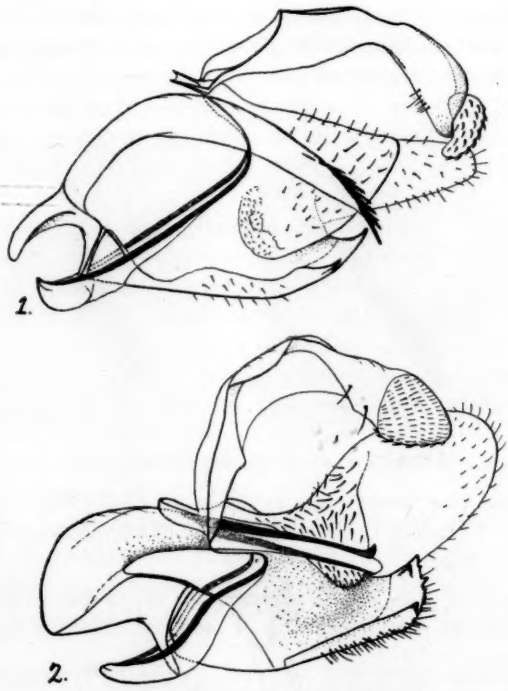
in the types but not always in other specimens); fringes slightly paler. Secondaries deep smoky with similarly colored fringes. Forelegs deep gray-brown; hinder pairs paler, the hind femora fringed dorsally with whitish hair; the tibiae and tarsi whitish, the latter with no distinct dark ringing. The genitalia (fig. 1) are of the *pruniella* type but the aedeagus is armed apically with a bunch of long spines, a feature which at once distinguishes it from the superficially very similar *innotabilis* Brn. Expanse 12-13 mm.

Female. Quite similar in coloration to the male.

Holotype—♂, Annapolis Royal, N. S., July 3, 1934, (bred from *Kalmia*) (J. McDunnough); No. 4071 in the Canadian National Collection, Ottawa.

Allotype—♀, same data, July 1.

Paratypes—3♂, 2♀, same data, June 26, 27, July 3. One of these will be deposited in the United States National Museum and another in the collection of Dr. A. Braun, Cincinnati, Ohio.



Male genitalia (lateral view with left clasper removed) of 1. *Haploptilia kalmiella* n. sp. 2. *H. duplicis* Braun.

Haploptilia duplicis Brn.

Coleophora duplicis Braun, 1921, Ent. News, XXXII, 16.

After making male genitalic slides of certain paratypic material kindly donated by Dr. Braun it became obvious that at least two species were involved under

the one name. Correspondence with Dr. Braun and the examination of further material has cleared up the matter fairly satisfactorily and shown that the name must be restricted to the following series of specimens:—the type series, reared under number B994, from *Aster shortii* and the series under number 995 from *Solidago caesia.* The material mentioned in the original description as reared from *Aster cordifolius* (B993) and the specimens from Balsam, N. C. are not conspecific. As here restricted the species possesses whitish antennae without definite annulations. The maculation of the forewing is quite variable, the color being light brownish with generally considerable whitish suffusion in the costal area and only a few scattered darker scales apically. The genitalia (fig. 2) afford the only sure means of differentiation; in the male organ the aedeagus is strengthened by two rod-like pieces of chitin, of equal length, situated one on each side (a group characteristic); the left-hand rod is armed apically with a distinct triangular thorn, whereas the right-hand one is without armature and ends in a blunt point. This, combined with other features in the apical spining of the sacculus, as can be noted in the illustration, should render the species easily recognizable. It appears to have a wide distribution in Canada, specimens being before me from the Gatineau region, Que.; Ottawa, Ont.; Jasper and Nordegg, Alta., and Summerland, B. C.

Haploptilia atlantica Heinr.

In the original description the food-plant of the species was given as *Prunus serotina;* in eastern Canada, however, willow and poplar seem to be the favored food-plants. Specimens of both cases and adults submitted to Mr. C. Heinrich at Washington have been determined by him as *atlantica.*

NEW NORTH AMERICAN CORIXIDAE WITH NOTES (HEMIPTERA).*

BY G. STUART WALLEY,

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In the following paper descriptions are presented for three apparently undescribed species of *Arctocorixa.* Notes are included on some additional species and a redescription presented for *Corisella tumida* (Uhler).

Arctocorixa bicoloripennis n. sp.

Pl. 2 figs. 5-10

Male.—Length 5.75 mm. Form and color pattern simulating *A. penniensis* Hungfd. but size a little smaller. Head short, vertex from above broadly arcuate continuous with margin of eyes. Width of vertex posteriorly between eyes equal to its median length. Face with a weak concavity extending dorsally slightly beyond lower margin of eyes and with greatest width distinctly less than interocular space. Inner margins of eyes only very slightly diverging ventrally. Post-ocular space narrow. Head with a few fine punctures and a few fine pale hairs, surface minutely coriaceous, shining. Antennae with apical segment slender, two-thirds as long as subapical segment. Lateral lobe of prothorax long, parallel-sided, apex

*Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa.

rounded. Moderately rastrate disk of pronotum scarcely twice as broad as median length, some of the transverse black lines impressed, median carina only faintly visible at base. Clavus moderately rastrate, corium weakly so in basal angles, beyond somewhat coriaceous, membrane area shining, unsculptured. Metaxyphus small, short, approximately right angled at apex. Stridular area of front femora extending beyond middle. Front tibiae moderately thickened, upper margin carinate. Pala rather short moderately thickened with weak carina on outer surface near upper margin, inwardly with 29 pegs in a single row which closely parallels the inner row of bristles throughout most of its length, basal 20 pegs rather short and blunt, those beyond longer and acute. Male genitalia with right clasper of the *modesta* type, left clasper slender with the inner margin reflexed in part to form a chitinous flange.

Head, front and middle legs and hind femora pale yellow, hind tibiae and tarsi yellow tinged with brownish along margins. All coxae, venter of thorax and basal three abdominal sternites brown. Lateral lobe of prothorax, meso- and metapleura largely yellow. Ground color of pronotal disk and hemielytra yellowish, the pronotal disk traversed by seven almost regular black bars which are in most part broader than the yellowish interspaces. Clavus with blackish bars, basal four or five regular, beyond becoming more irregular and sometimes furcate. Corium and membrane area rather evenly mottled with short sigmoid interlocking blackish bars, the amount of black predominating over the yellow ground color. Membrane suture marked by an oblique pale stripe.

Holotype.—♂, Minaki, Ont., July 4, 1928, (J. McDunnough); No. 4046 in the Canadian National Collection, Ottawa, Ont.

Allotype.—♀, same data as holotype.

Paratypes.—5 ♀ ♀, same data as holotype; ♂, Glen Souris, Man., Sept. 21, 1922, (N. Criddle); ♂, Brent's Lake, Summerland, B. C., Oct. 29, 1931, (A. N. Gartrell).

Notes.—The color pattern in the female paratypes shows a slight variation. In some specimens the blackish markings on the corium are more fused and tend to unite to form indistinct longitudinal series.

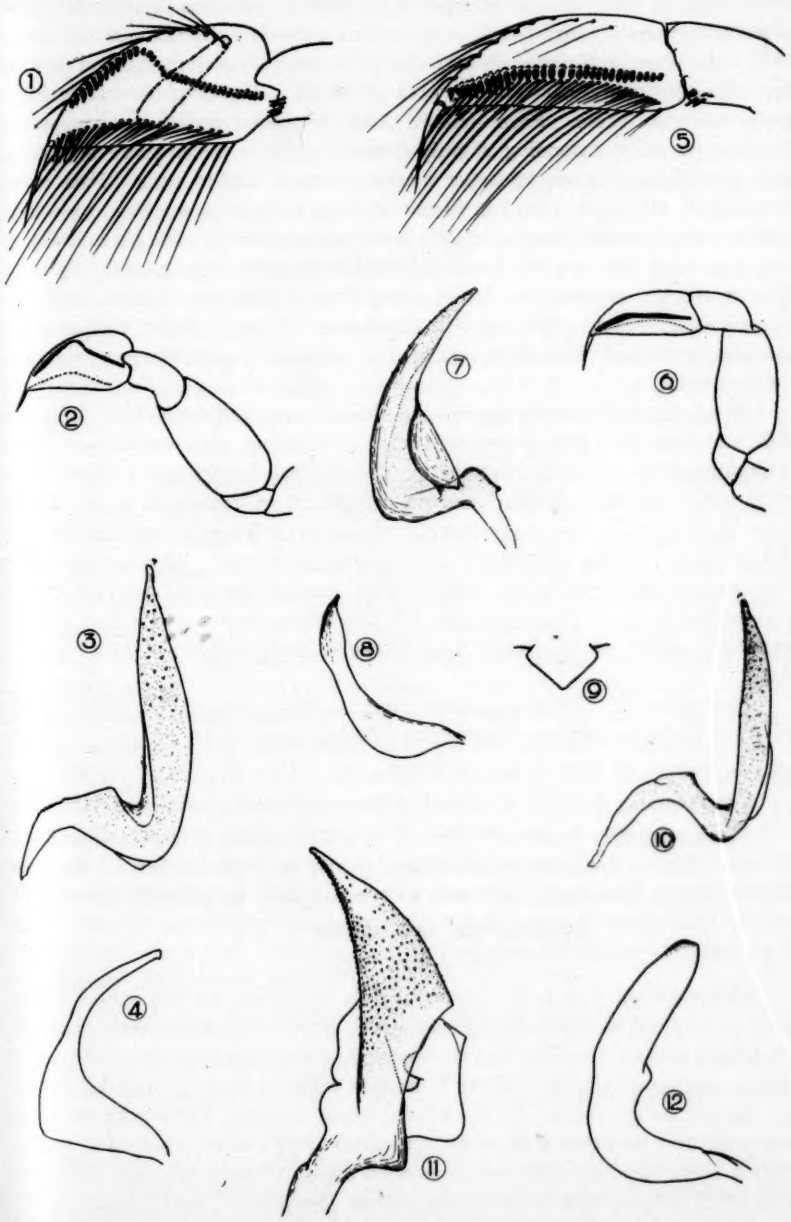
The Brent's Lake male has the pala with 31 pegs and the hemielytral pattern slightly more irregular than the type. It may represent a western race.

The species closely resembles *A. penniensis* Hungfd. but may be distinguished by the narrower postocular space, narrower vertex and the form of the male genitalia. In my table to the Ontario species (Can. Ent. LXII, 285, 1930,) it traces to section 15.

Arctocorixa scabricula n. sp.

Pl. 2 figs. 11, 12.

Male.—Length 9.5 mm. Vertex very broadly rounded, not produced, posterior width between eyes equal to length at middle. Face with a rather small flattened area scarcely as broad as interocular space and extending dorsally a little above lower margin of eyes. Inner margins of eyes parallel except for very slight convergence at posterior angles. Head with a few minute punctures. Postocular space slightly broadened toward inner angles of eyes. Antenna with



Arctocorixa nevadensis n. sp. 1. front tarsus of male, 2. front leg of male, 3. left clasper of male, 4. right clasper of male. *Arctocorixa bicoloripennis* n. sp. 5. front tarsus of male, 6. front leg of male, 7. left clasper of male (ventral aspect), 8. right clasper of male, 9. metaxyphus, 10. left clasper of male. *Arctocorixa scabricula* n. sp. 11. left clasper of male (ventral aspect), 12. right clasper of male.

last segment slender, tapering a little apically, half as long as sub-apical segment. Lateral lobe of prothorax one-third longer than broad, sides sub-parallel, apex obliquely truncate. Rastrate disk of pronotum one-half as long as broad, median carina only very faintly visible in front. Clavus and corium (except extreme apex) distincty rastrate, membrane area polished. Metaxyphus a little longer than broad, apex acute. Front femora stout, broadly elliptical in cross-section, stridular area large extending slightly beyond middle. Tibia twice as long as broad with distinct carina on upper margin from middle to apex. Pala closely resembling *A. interrupta* (Say) in form and disposition of pegs. Pegs 30 in number in an even row beginning at middle near base, extending outward and slightly upward to reach the upper margin a little before apex, continued along upper and outer margin to middle of latter, apical 8 pegs smaller and more closely set than preceding. Male genitalia with distinctive claspers. Right clasper short, blunt usually directed obliquely across apex of capsule. Strigil elongate, rectangular with 9 striae.

Head, legs, pleura and sternum of thorax dirty yellowish, hind tibiae and middle and hind tarsi pale brownish, venter of abdomen yellowish-brown. Disk of pronotum dirty yellowish traversed by 9 or 10 black bands, anterior four bands slightly wider and more regular than the remainder. Clavus with a few slender oblique black bars on base, beyond with heavier more irregular and furcate bars which are massed at the middle of clavus so that the slender yellowish interspaces are broken and greatly reduced. Corium with undulate irregular transverse black bars separated by much narrower yellowish interspaces, bars heaviest near apex of commissure. Bars of membrane very irregular and continuous with those of clavus.

Holotype.— ♂, Guelph, Ontario, Aug. 4, 1931, (W. H. G. Patton); No. 4047 in the Canadian National Collection, Ottawa, Ont.

Allotype.— ♀, same date as holotype.

Paratypes.—3 ♂ ♂, 6 ♀ ♀, same locality as holotype, August and September.

Notes.—In size, color and form of pala this species is very similar to *A. interrupta* (Say). From *interrupta* (Say) it may be distinguished by the more distinctly rastrate hemielytra, narrower vertex and form of the male genitalia.

Arctocorixa nevadensis n. sp.

Pl. 2 figs. 1-4.

Male.—Length 6.25 mm. Vertex slightly produced, one and one-half times as wide posteriorly between eyes as length at middle. Face moderately flattened, the flattened area as broad as interocular space, extending dorsally a little above the lower margin of the eyes where it merges with the broadly rounded vertex. Inner margins of eyes parallel. Postocular space narrow. Head with the usual row of punctures on either side vertex, punctures along inner margins and scattered over a slight depression at inner posterior angles of eyes, margins and lower portion of facial area with scattered punctures. Surface of head minutely coriaceous, shining with scattered fine pale hairs arising from punctures, hairs of facial depression appressed. Antenna with last segment slender, two-thirds as long as sub-apical segment. Lateral lobe of prothorax almost twice as long as

broad, parallel sided with apex subtruncate. Weakly rastrate disk of pronotum three-fifths as long as broad, median carina present only for short distance at base. Clavus and base of corium weakly rastrate, beyond and on membrane area without sculpture; shining. Metaxyphus a little longer than broad, apex acute. Front femora stout, moderately flattened, the lower margin weakly carinate, stridular area extending a little beyond middle. Tibia curved, upper margin carinate, upper inner angle a little produced at apex. Pala broad, flattened, outer face bluntly carinate at middle, inner face with an oblique carinate swelling across middle between upper margin and inner row of bristles. Pegs in a close set row beginning near base a little below middle and extending outward and slightly upward traversing the oblique carina, thence a little more strongly upward to join upper margin just before middle, continuing along upper margin to end a short distance before apex, 37 in number the apical 7 pegs more elongate and acutely pointed. Male genitalia with right clasper distinctive, consisting of a rather broad base and long slender apical section which ends bluntly with a minute tooth on lower apical angle; left clasper with apex slender, acute. Strigil rounded with 6 striae.

Head, legs, pleura, sternum of thorax and apical half of abdomen below creamy yelowish with portion of mesosternum, base of metaxyphus and abdominal sternites 1, 2 and base of 3 brownish. Middle and hind tarsi brownish tipped. Lower portion of face and posterior margin of vertex tinged with brown. Ground color of pronotum and hemielytra pale yellowish, disk of pronotum with about 10 transverse brown lines which are about one-half as broad as the yellowish interspaces, the anterior and posterior lines regular, the median two or three broken. Clavus with about 20 transverse brown lines, basal 5 or 6 oblique narrower than interspaces and regular, followed by 5 or 6 broader lines which are frequently furcate, the furcae often united with the furcae of adjoining lines, posterior 8 or 9 lines regular, short, unforked. Basal half of corium with brown lines slightly wider than interspaces, for the most part these extend across corium rather regularly though they are often furcate and narrowly united at apices; beyond the middle of the corium the brown lines become more irregular and the appearance of transverse lines is lost. Membrane area evenly maculate with irregular sigmoid brown lines arranged somewhat transversely, a brown line separating membrane from corium. Embolium with brownish spot at apex of opaque area and another on membrane just beyond apex of embolium.

Holotype.— ♂, Humboldt River, Nevada (S. Garman).

Allotype.— ♀, same data as holotype.

Paratypes.—12 ♂ ♂, 14 ♀ ♀, same data as holotype. Paratypes taken in August.

Holotype, Allotype and Paratypes in the Museum of Comparative Zoology, Cambridge, Mass. Paratypes, No. 4045, in Canadian National Collection, Ottawa, Ont.

Notes—In the drawing of the palar structure the broken dot-dash line indicates the area occupied by the oblique swelling described above.

Arctocorixa zimmermanni (Fieb.) (= *compressa* Abbott)—From Dr. Lundblad's redescription and figures of the type female of *zimmermanni* and a male specimen from Georgia which he associates with it I am convinced that it is the same species as was described by Abbott (Bull. Brookl. Ent. Soc., VIII, 83, 1913) as *A. compressa*. Through the kindness of Mr. J. R. de la Torre Bueno I have received a series of *A. compressa* bearing the data "Mixon's Hammoch, Okefenoke Swamp, Ga., June 16, 1912." These are evidently from the same material as the original type lot. In addition I have also seen specimens from Southern Pines, N. C., March 1, 1918 (A. H. Manee). The elytral pattern of the females before me is identical with Lundblad's figure of the type (Arch. f. Hydrobiol., XX, Pl. XI, fig. 4) and the male characters which he illustrates (Zool. Anz. 80, 201) agree perfectly with the specimens mentioned above so that I have no hesitation in pronouncing the species a synonym of *zimmermanni*.

Arctocorixa atopodonta Hungfd.—Aweme, Man., Oct. 11, 1916 (Criddle); Creston, B. C., Nov. 19, 1930 (G. Stace Smith); Pingree Park, Colo., Aug. 15-22, 1924 (Drake and Hottes).

Arctocorixa bifida Hungfd.—Described from Lost Lake, Alta. Specimens are at hand from the following Alberta localities—Cypress Hills, Lethbridge, Medicine Hat, New Dayton and from Vernon, B. C.

Arctocorixa michiganensis Hungfd.—Two males and two females from Creston, B. C., Nov. 19, 1930 (G. Stace Smith). They are slightly larger than typical *michiganensis* as it occurs in eastern Canada.

Arctocorixa decoratella Hungfd.—Specimens are at hand ranging from extreme eastern Quebec to Nicola Lake, B. C.

Arctocorixa minorella Hungfd.—Merivale, Ont., May 9, 1930 (Walley).

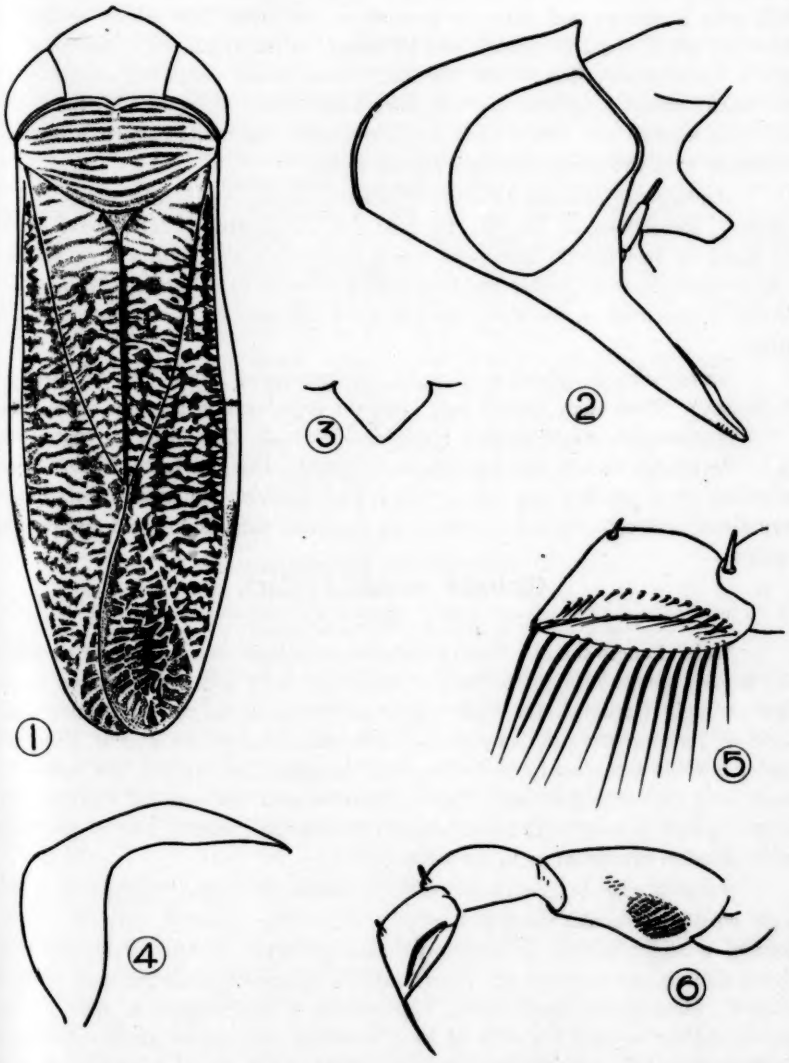
Arctocorixa mullettensis Hungfd. (= *impersonata* Wly.)—From a study of paratypes received through the kindness of Dr. Hungerford I am convinced that *impersonata* is a synonym.

Arctocorixa obliqua Hungfd.—Eastern Panhandle, Aug. 5, Morgantown, Aug. 23, W. Va.; Ames, Ia., Apr. 2, 1928 (Walley).

Arctocorixa solensis Hungfd.—Guelph, Ont., Sept. 1931 (Patton). This species has hitherto only been recorded from the type locality, Douglas Lake, Michigan. In my key to the Ontario species (Can. Ent. LXII, 285, 1930) it traces to *modesta* Abb. It differs from *modesta* in being slightly longer and more slender with a broader interocular space. In *solensis* the male pala is a little shorter and thicker with the apex less acute and the upper and lower margins parallel in the basal two-thirds. In *modesta* the pala is thin with the apex acute and the upper margin evenly arcuate from its base. In *modesta* the metaxyphus is in the form of an equilateral triangle while in *solensis* it is distinctly longer than its basal width. In the color pattern of *modesta* the pale markings tend to predominate whereas in *solensis* they are much reduced being more slender and broken on the apex of the clavus and the corium. The Guelph specimen measures scarcely 5 mm. and is slightly smaller than a paratype of *solensis* which is before me. The right genital clasper of *solensis* differs only slightly from that of *modesta*.

Arctocorixa hubbelli Hungfd.—Guelph, Ont., Sept. 1931 (Patton); Knox-

CAN. ENT. VOL. LXVIII. PLATE 3.



Corisella tumida Uhl. 1. Dorsal aspect. 2. lateral aspect of head of male. 3. metaxyphus. 4. right clasper of male. 5. front tarsus of male. 6. front leg of male.

ville, Tenn., July 4, 1891; Natchez, Miss., Sept. 8, 1924 (Harris); Kentucky (Sanborn). This is apparently a rather rare but widely distributed species. It bears a superficial resemblance to *lineata* Forst. (= *trilineata* Prov.) to which it runs in my key to species (op. cit.). The interocular space is narrower, the male pala is shorter and with the pegs in an ascending row which reaches the upper margin at about the middle and terminates at the apical third; the corial pattern is less distinctly lineate with the black flecks more irregularly margined and less solidly united longitudinally. In *lineata* the pala is elongate with the pegs in an evenly arcuate row which continues to the apex; the corial pattern is distinctly tri-lineate with the black lineations almost entire.

Arctocorixa convexa (Fieb.)—Waterton Lakes, Alta., July 2, 1930 (J. H. Pepper); Revelstoke, B. C., July 13, 1931 (A. N. Gartrell). The above records are based on two female specimens which agree very well with a long series of *convexa* from eastern Quebec and four examples from Ft. Churchill, Man. I have already commented on the male characters for this species (Can. Ent. LXII, 77, 1930).

Arctocorixa douglasensis Hungfd.—Minneapolis, Minn. Oct. 11, 1919 (R. F. Hussey). Previously known only from the type locality, Douglas Lake, Mich.

Arctocorixa compressoidea Hungfd.—Merivale, Ont. May 9, 1930 (Walley). Previously known only from the type locality, Douglas Lake, Mich. Traces to section 17 in my key (op. cit.). From both *modesta* and *quebecensis* it is at once distinguished by the form of the male genitalia, pala, and elytral and pronotal pattern.

Corisella tumida (Uhler).

Pl. 3 Figs. 1-6.

Male—Length 6 mm. Form somewhat as in *Palmacorixa*, the vertex noticeably tumid, almost acuminate, the rounded apex with a definite narrow carina. Face strongly flattened, the flattened area not as broad as interocular space. Width of vertex posteriorly between eyes subequal to its median length. Puncturation of head as described by Uhler, surface including face shining, the latter with sparse very fine very short erect hairs. Antenna with last segment short, slender, about one-half as long as the stout subapical segment. Lateral lobe of prothorax rather slender, somewhat as in *serrulata* (Uhl.).

Polished disc of pronotum twice as broad as median length: at middle length equals interocular space at base of vertex. Disc polished, only very faintly rastrate, a slight carina on anterior third; posterior margin evenly rounded. Elytra shining, not rastrate but very faintly roughened, membrane area well developed. Metaxyphus small, short, approximately right angled at apex. Front femora slightly swollen inwardly at base; stridular area rather small not extending beyond middle. Front tibia as long as pala, outer margin carinate beyond middle, at apex with a stout erect spine-like peg. Pala short, the apex obliquely truncate, the narrow upper margin bearing a stout erect spine-like peg just before the truncate portion, pegs in lower row modified, small, consisting of 4 or 5 bristles at base followed by 6 or 7 well separated small pegs which gradually lengthen to be continued by 4 or 5 shorter bristles. The slightly curved row of

pegs confined to the lower half of the pala, the inner surface of pala above pegs obliquely concave so that the region of the upper margin bearing the spine-like peg is elevated above the inner surface. Male genitalia with right clasper broad basally narrowed and curved beyond to the somewhat attenuate apex. Strigil very small, borne on a narrow petiole.

Ground color dusky yellow. Pronotum with about 10 narrow transverse blackish bars which are narrower than the interspaces. Bars before and behind slightly abbreviated laterally, almost entire; those at middle interrupted, furcate. Clavus weakly maculate at base, beyond with brownish reticulae from outer to inner margins, slightly massed along middle but not forming series or stripes. Corium similarly reticulate, membrane with brownish marks predominant, the bars joined along the circumference. Venter of thorax and legs yellow. Dorsum and venter of abdomen wholly dark brown. Apex of middle tarsi and entire hind tarsi brown.

Described from a male specimen in the California Academy of Science bearing the data "Denver, Colo. 7-12-1903. Van Duzee Collector" loaned for study through the kindness of Dr. E. P. Van Duzee.

I have seen also a single female from Sloan's Lake, Denver, now in the possession of the Museum of Comparative Zoology at Cambridge.

FURTHER NOTES ON CANADIAN PLUME MOTHS (LEPID., PTEROPHORIDAE)*.

BY J. McDUNNOUGH,
Ottawa, Ont

Oidaematophorus occidentalis Wlshm.

Oedemataphorus ocicdentalis Walsingham, 1880, Pter. Cal. Oreg. pp. IX, 37, Pl. II, figs. 13, 14.
Oidaematophorus occidentalis Barnes & Lindsey, 1921, Cont. Nat. Hist. Lep. N. Am. IV (4) 381, Pl. XLV, figs. 7, 8; McDunnough, 1927, Trans. Roy. Soc. Can. Sec. V, 183, Pl. II, fig. 4; Clarke, 1934, Can. Ent. LXVI, 172.

Walsingham described this species from a variable series of specimens taken in Colusa, Shasta and Siskiyou Cos., Calif. No definite type is designated but from correspondence with Mr. W. H. T. Tams of the British Museum I find that the author marked his types "Type I" and "Type II." Type I, the obvious holotype, is labelled "Pit River, Shasta Co. California, VII, 1871, Pl. 2, fig. 13" and according to Mr. Tams is much the tawnier of the two "types." Type II is labelled "Uncle Sam Mount, Lake Co. Calif. VI, 1871, Pl. 2, fig. 14" and, as the figure shows, is a pale, immaculate form. Barnes and Lindsey make *californica* Grin. (1908, Can. Ent. XL, 321) from S. Calif. a synonym and describe the color of the forewings as *creamy-white to tawny-brown*, the latter color being that given by Grinnell in his description of *californica*.

In my paper on Canadian Plume Moths I mention having bred this species at Waterton Lakes, Alta. from larvae feeding on the flowers of a *Balsamorrhiza* species and give a figure of the pupa; Gates Clarke also in a short note gives the food-plants of *occidentalis* as *Balsamorrhiza* and *Wyethia*. In the light, however, of later breedings an element of doubt has crept in as to whether the *Balsamorrhiza* feeder is the true *occidentalis* or not.

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*Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa.

In 1933 I found in June a few plume-moth larvae feeding on the flowers of a *Grindelia* species growing commonly on the rocky shore of Foul Bay at Victoria B. C.; as I was travelling about considerably at the time I was not very successful with the rearing of these but eventually secured two adults (♂ and ♀) which emerged on July 17. These, while possessing the maculation of *occidentalis* were distinctly deep tawny-brown in color as compared with the light fawn of my two *Balsamorrhiza* specimens. Of this latter I secured three more specimens in 1934, bred by H. B. Leech from the same species of plant at Aspen Grove, B. C. and identical in coloration with my Alberta specimens. Besides the difference in coloration the *Grindelia* feeder appears to have distinctly longer palpi than the *Balsamorrhiza* one and in this respect agrees with most of the specimens under the name *occidentalis* in the Canadian National Collection from various points in southern B. C., Idaho, and Modoc and Alameda Cos., California. The male genitalia also fit quite well with the figure given by Lindsey for *occidentalis*. From the two slides before me of the male genitalia of the *Balsamorrhiza* feeder I note that the claspers are on the whole somewhat smaller and the left harpe shorter and more sickle-shaped, due to a greater curvature in the basal section of this organ. Finally in the pupal cases I find that the *Grindelia* feeder shows much longer hairs on the dorsal and subdorsal tubercles, notably on the thoracic segments and that the tubercle immediately dorsad of the spiracle has one very long seta, pointing outward and one shorter seta pointing forward, whereas there is only a single moderately long seta (see my previous figure), pointing forward, present on this tubercle in the *Balsamorrhiza* feeder.

Two very closely allied species appear therefore to be indicated, but at the present time it is impossible to determine to which the names *occidentalis* Wlshm. and *californica* Grin. should be correctly applied. Walsingham's remark that one of his specimens were bred from "a species of sunflower" is not very helpful especially as this specimen was obviously not one of his types. Extensive collecting and breeding in the Shasta region will doubtless in time solve the problem.

Oidaematophorus mathewianus Zell.

Leioptilus mathewianus Zeller, 1874, Verh. Zool. Bot. Ges. Wien, XXIV, 445, Pl. XII, fig. 13
Oidaematophorus mathewianus Barnes & Lindsey, 1921, Cont. Nat. Hist. Lep. N. Am. IV (4) 383; McDunnough, 1927, Trans. Roy. Soc. Can. Sec. V, 183, Pl. I, fig. 13.
Oidaematophorus fishi McDunnough (*nec* Fernald), 1927, Trans. Roy. Soc. Can. Sec. V, 184, Pl. I, fig. 14 (*err. det.*).

With more material before me, especially from the eastern section of the country I now believe that in my previous notes (cited above) I had been endeavoring to split up into two species what must be considered as a single species, to which the name *mathewianus* Zell. seems best applicable.

In view of the fact that the unique female type of *fishii* Fern. has been practically destroyed, as stated by Lindsey, there seems no point to be gained in not accepting his application of this name as referring to a species with considerable sex dimorphism in color and pattern and much reduced tibial tuftings, occurring in Nevada and extending southward into Utah, Arizona and S. California. I am as yet unfamiliar with the male of this species, having before me merely two rather worn females from Utah which are practically useless for purposes of identification. I believe, however, that the species should be deleted from our

Canadian lists and the specimens I recorded under this name transferred to *mathewianus;* the very slight genitalic differences shown in my figs. 13, 14 (*vide supra*) are apparently individual rather than specific.

Mathewianus, as I now determine it, seems not uncommon in eastern Canada; I have specimens from Bobcaygeon and Merivale (near Ottawa), Ont.; Kazbazua and Knowlton, Que., and also two females from Gorham, N. H. In general the males are somewhat more suffused with gray on the primaries than the females and both sexes show slightly fewer brown tinges than are exhibited by our two topotypical specimens from Vancouver Is.; they agree, however, quite well with specimens from the interior of British Columbia and the Alberta Rockies

Unfortunately it has, as yet, not been possible to discover the larva and its food-plant; at Bobcaygeon I found a pupa attached to the underside of a wild cherry leaf which produced a male imago of *mathewianus,* but cherry is obviously not the food-plant and the presence of the pupa on the leaf was doubtless a mere accident. This pupal case shows an extraordinary similarity in setal arrangement to that of *guttatus* Wlshm., but the setae show *no* fine spicules and there appear to be minor differences in the length of certain of them. With food-plant and larva known we shall be better able to decide as to the specific oneness of our eastern and western specimens, but for the present I believe the reference to *mathewianus* rather than to *fishii* is warranted.

Oidaematophorus guttatus Wlshm.

Oedematophorus guttatus Walsingham, 1880, Pter. Cal. Oreg. 36, Pl. II, fig. 12.
Oidaematophorus guttatus Barnes & Lindsey, 1921, Cont. Nat. Hist. Lep. N. Am., IV, No. 4, 388, Pl. XLV, fig. 16, Pl. LI, fig. 5; McDunnough, 1927, Trans. Roy. Soc. Can. Sec. V, 1885, Pl. II, fig. 5.

In a wood-lot near the junction of the Jock and Rideau rivers and about 15 miles south of Ottawa, numerous plume larvae were found in early June, 1935, on *Hydrophyllum virginianum.* When the adults emerged in late June they proved to belong to the above species or at least to the species I identified and recorded as such from Waterton, Alta. on *Phacelia heterophylla,* a plant closely allied to *Hydrophyllum.* To the best of my knowledge this is the first eastern record of the species and as my larval notes in the above mentioned article were very brief I supplement them with the following more detailed description.

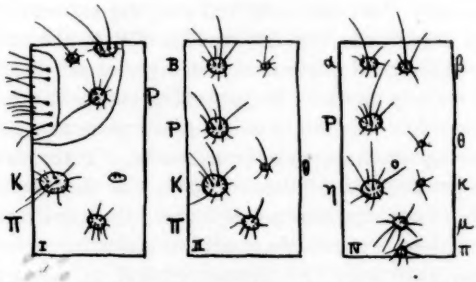
Larva. Length 13 mm. Head small, retractile, heavily overhung by long setae from the prothoracic margin, pale flesh-color with dark labrum; setae rather short, pale. Body of the usual Pterophorid shape, flatly cylindrical with broad, lunate, lateral flanges and large verrucae, bearing numerous long, smooth, pale setae. Integument smooth without short, secondary hair. Color rather deep olive-green with the posterior margins of segments faintly yellow-tinted. There is a fine yellow dorsal line, a broken and diffuse yellow-green band crossing verrucae *Alpha* and *Beta,* a fine yellow sinuate line above the *Kappa* verruca and a pale yellow-green stigmatal line with scattered pale spots below it on the flange. Verrucae large, knob-like, whitish, with some darker shading on dorsal sides of *Alpha, Beta* and *Kappa.* When fully mature the darker green areas turn deep pink, giving the appearance of a broad ruddy subdorsal stripe immediately ventrad of the dorsal verrucae; the setae from these verrucae also become black-tipped.

Spiracles very small, only slightly raised, pale ochreous with dark rim. Legs and prolegs pale, the latter with a semicircle of 8-9 crotchets along inner edge, the anal claspers with 10-11 rather stouter ones.

The prothoracic shield is improminent and pale flesh-color; on its anterior portion are two large slightly raised areas, closely approximate mediodorsally, containing a large number of setae (25-30) with tubercle-like bases; there is an anterior row in which the bases are mostly blackish and the setae overhang the head; ventrad to these about 6 longer, more upright setae with pale bases are scattered over the posterior half and interspersed with sparse short, blackish hair; these probably represent the *alpha-gamma* group. Immediately posterior to these raised areas, on each side of the mid-dorsal line, are two, long, single setae with strong conical bases around which are a few short, scattered, dark hairs; these are presumably the *beta* setae. On the posterior margin of the plate are three verrucae, placed in a faintly curved row; the medio-dorsal one shows traces of black strigae around the base and contains two moderately long pale setae, bent slightly cephalad and placed one behind the other; the two lateral verrucae contain one long upright seta, two shorter ones, of about same length as those of the mid-dorsal verruca, and one short seta, bent forward, on anterior margin, as well as scattered short dark hair; I am at a loss to correlate these with the Fracker system but suppose the lateral ones must be *rho*. The large *Kappa* verruca is situated on the anterior margin of the segment and contains numerous long setae with conical bases, most of them projecting forward over the head; there are 4 setae, longer and more upright than the others, two in the central area of the verruca and two near the posterior margin; also a few scattered, quite short ones around their bases. The spiracle is well towards the posterior margin of segment and only very slightly cephalad of *Kappa*. The *Pi* verruca is quite similar in number of setae to the *Kappa* one but the setae are weaker and somewhat shorter. On the meso- and metathorax there are three large verrucae situated at equal intervals along the anterior margin, the most ventral one (*Kappa*) being on the flange. The *Beta* verruca (I and II of Dyar) contains two long upright setae, placed one behind the other, the posterior one slightly ventrad; further, anteriorly and posteriorly to these, single setae rather more than half as long, with less prominent bases and inclined forward and backward respectively; the whole surrounded by a circle of about twelve short setae. Midway between *Beta* and the posterior margin of segment is a smaller verruca bearing a single seta of moderate length, directed slightly caudad at apex and surrounded by a circle of 6-8 short hairs. The arrangement of setae on the *Rho* verruca is very similar to that on the *Beta* one whilst on *Kappa* there is an augmentation in the number of setae and the more ventral ones are directed outward; posterior and somewhat dorsad to *Kappa* is a small verruca (*theta*) with single short central seta in a circle of shorter hairs; *Pi* is much the same as on prothorax.

On the abdominal segments I-VII the *alpha* and *beta* verrucae are rather close together, the former with a long central upright seta, a shorter anterior one, directed forward, and a circlet of still shorter hairs around the circumference; in *beta* the single long seta is directed somewhat cephalad, whilst posterior to this

two shorter setae are directed divergently backward; the usual circlet of short setae is present. *Rho* has a central, long, upright seta, single, shorter, anterior and posterior ones, directed cephalad and caudad respectively, and the usual circlet of short setae. The spiracle is well ventrad and slightly caudad of *Rho* whilst *theta,* well caudad of both and slightly dorsad of spiracle, is represented by a small verruca with a circlet of about six short hairs. What corresponds to *Kappa* of the thoracic segments and which is a large verruca with numerous long and short setae must apparently be called *eta* as posterad and slightly dorsad of this and directly ventrad of *theta* is a small verruca bearing a moderately long seta and a circlet of 4-6 hairs to which only the name *kappa* would appear to be applicable. *Mu* is a large verruca very similar in setal arrangement and similarly placed to *Pi* of the thoracic segments whilst *Pi,* at the base of the prolegs, is a large oblong verruca with two moderately long and twelve or more short setae.



Setal pattern of thoracic and abdominal segments in the larva of *Oidaematophorus guttatus* Wlshm.

On the eighth abdominal segment *Rho* has decreased somewhat in size whilst *theta* and *kappa* have disappeared, apparently absorbed into a very large verruca which may now be called *Kappa. Mu* is also reduced and has become entirely ventral. On IX the *alpha* and *beta* verrucae are united and the large verruca in consequence shows two long setae as well as the usual shorter ones; *Rho* is larger than on the preceding segments and also has two long setae, whilst *Kappa* is reduced in size with single long seta, directed caudad. On X the poorly defined anal plate shows a large dorsal verruca with numerous setae, of which about five are long, and a smaller lateral verruca with three of the setae long.

As the setal pattern outlined above appears characteristic for the genus and as no illustration to correspond to it occurs in either Forbes or Fracker I append a diagram which should illustrate the salient features.

Pupa. The rather characteristically marked pupa was fairly satisfactorily illustrated in my previous notes on the species. It is broad and chunky with the cephalic end rather squarely truncate and the ventral surface much flattened. There is a range of color variation from pale green to dark reddish brown and in most instances (a few specimens occurred which were immaculate pale green) quite a distinctive darker maculation; this consists of a large irregular blackish patch on wing-sheaths near base, the marginal setae being also similarly darker at this point; small dorsal dark patches on anterior and posterior margins of meso-

thorax from which arise (especially from the posterior patch) clusters of small black setae; broad subdorsal oblique stripes, varying in shade from olive-brown to blackish, corresponding to depth of ground color; below the subdorsal stripes a narrow lateral stripe showing traces of anterior bifurcation. Frequently there are traces of a pale medio-dorsal line, accentuated by dark lateral shading. The antero-lateral halves of the abdominal segments are faintly ribbed transversely and the posterior section finely shagreened. Spiracles on segments II-VII prominent, raised, with black bases. On the antennal sheath there is a row of minute pale setae and similar rows occur along the principal veins of the mesothoracic wing-sheath; a row of much longer setae, projecting outward, occurs near the dorsal edge of the sheath, and the bases of both wing-sheaths are minutely setose. There is the usual cluster of pale hairs projecting forward from the front and antennal bases. The prothorax has two long dorsal setae, one on each side of the median line anteriorly, and two lateral setae of which the ventral one is in the lateral corner; there is also sparse, very short hair scattered over the segment. The long dorsal setae on meso- and metathorax are arranged parallel to the mid-dorsal line; of these two pairs in the central portion of the segment are most prominent and directly ventrad of these is another pair projecting outward; apart from the dark patch already mentioned the secondary hairs are not numerous although very fine minute ones are sparsely scattered over the segments. On the abdominal segments the dorsal verrucae are rather small, knob-shaped, with the setae arranged in fan-shape; *alpha* shows a long seta directed cephalad with usually an anterior and a posterior shorter one; *beta,* immediately caudad of *alpha,* has a dorsal row of three subequal, slightly spiculate setae and directly ventrad of this a moderately long anterior seta, directed forward, and a longer posterior seta pointing backward with two further very short hairs at base. In the mediodorsal line between the *beta* setae is a single small seta and caudoventrad of this a further similar one on each side with the occasional addition of a few secondary hairs. Directly dorsad of the spiracle is a moderately long seta (*rho*), pointing cephalad, accompanied by a minute hair, and well posterior to this and slightly dorsad a group of 2-5 small setae (? *theta*) surrounded by sparse secondary hairs. Caudo-ventrad of the spiracle is a small knob-like verruca (*Eta ?*) with about six short setae and a very prominent ridge-like verruca (*mu*) with 10-12 long setae, arranged in fan-shape and faintly spiculate. Ventrally *Pi* is represented on IV-VII by a small verruca with 3-4 short setae and on VIII by two short hairs. *Sigma* is represented on IV by a single hair; on V and VI by a longitudinal row of three hairs, the posterior longest and directed caudad; on VII variably by two or three hairs and on X by two very minute hairs just caudad of the group of knobbed hairs. The cephalic margin of segment X contains a large group of small knobbed setae situated in a slight depression, those on the outer circumference being the longer. The well-developed cremaster is also furnished with numerous setae of a similar character, the longest occurring apically. The whole ventral surface of the segment is very finely transversely ribbed.

Oidaematophorus stramineus Wlshm.

At the present time I am somewhat doubtful as to whether Lindsey's action (op. cit. 421) in sinking *angustus* Wlshm. as a synonym of *stramineus* was correct.

On August 1, 1933 I took a long series of quite fresh specimens near Pavilion, B. C., flying around and out of sage-brush, where they appeared to be resting; to the best of my knowledge there was no *Anaphalis* growing in the vicinity, this being stated in the revision (following a note by Dyar) to be the larval food-plant of *stramineus*. These specimens are somewhat smaller and paler than the long series of specimens under the name *stramineus* in our collections, ranging in distribution across the entire dominion; in the male genitalia the claspers of the Pavilion specimens are also shorter and narrower and the left harpe much more slender and scarcely as long as in the various slides made from *stramineus* material. There seems, therefore, the possibility that two species are involved and that the Pavilion series represents the true *angustus* Wlshm. Until, however, the type material on which the two names were based can be carefully examined and until the larvae of both forms are definitely known along with their food-plants, the identity will have to remain uncertain.

In conclusion it might be stated that adults of *stramineus* were extremely plentiful in late August at White Point Beach, N. S. in 1935. There was no *Anaphalis* growing in the vicinity of the areas where the moths were most prevalent, but, amongst other low plants and grasses, there was a great abundance of a species of *Aster* with narrow leaves and a purple flower. At the time, of course, no larvae were to be found, but the above facts raise considerable doubt in my mind as to whether *Anaphalis* will prove to be the correct food-plant of the species, especially since Dyar's very brief description appears hardly at all applicable to the ordinary type of *Oidaematophorus* larvae.

Adaina montana Wlshm.

In my recent notes on the early stages of this species, (1935, Can. Ent. LXVII, 73) an error has crept in regarding the food-plant of the larva which I wish to correct. It was stated that the larvae were found on the leaves of a *Solidago* species; further observations in 1935, at a later date when the plant was in bloom, proved conclusively that it was on an *Aster* species with long narrow leaf and single rather large purple flower and not on a *Solidago* that the larvae were found.

ENTOMOLOGICAL SOCIETY OF BRITISH COLUMBIA.

The thirty-fifth annual meeting of the Entomological Society of British Columbia was held on Saturday, February 29, 1936, in the Daily Province Board Room, Vancouver, B.C. The President, Mr. Downes, was in the chair.

There were twenty-seven members in atttendance and eight new members were elected, five from British Columbia and three from Washington. It is gratifying to note that our Society is drawing members from all over the Northwest and that men from the United States Bureau of Entomology are taking a keen interest in the meeting.

The Secretary-Treasurer gave a favourable report as to finances and was happy to report the establishment of a reserve fund to be untouched until it becomes large enough to publish the Proceedings on a quarterly basis independent of any government grants. If such a fund had been established when the Society was formed, this basis would be possible at the present time. Now, it may take

fifteen or twenty years more to attain this goal. One member demonstrated his interest in the Society by donating five dollars to the fund immediately upon its establishment. It is to be hoped that other contributions will be made during the coming year.

Mr. Ralph Hopping was honoured by being elected President for the ensuing year. Mr. L. E. Marmont was re-elected Honorary President. Other officers elected were as follows:—

Vice-President (Coast) .....G. J. Spencer.
" " (Interior) .....E. R. Buckell.
Secretary-Treasurer .....Geo. R. Hopping.
Auditor .....J. W. Eastham.
Advisory Board .....J. W. Eastham, W. Downes, Geo. H. Larnder, J. R. J. Llewellyn-Jones, H. F. Olds.

The following papers were presented:

1.	Presidential Address	W. Downes
2.	A Study of Host Tissues in Relation to Varying Feeding Rates of Individual Ticks	J. D. Gregson
3.	Notes on an European Weevil, *Ceutorhynchus assimilis* Payk., recently found in the State of Washington	W. W. Baker
4.	A Review of Tick Paralysis in Cattle in B. C. with Notes on Several New Cases	T. K. Moilliet
5.	A Preliminary List of the Protozoan Fauna of British Columbia Termites	J. K. Jacob
6.	The Status of the Gladiolus Thrips in British Columbia	R. Glendenning
7.	Some Food Plants of Lepidopterous Larvae	J. R. J. Llewelyn-Jones
8.	The Rat Menace in Vancouver in 1936	G. J. Spencer
9.	The Introduction and Propagation of *Digonochaeta setipennis* Fall, a Parasite of the European Earwig	G. W. Getzendaner
10.	Progress made in 1935 in rearing Earwig Parasites	W. Downes
11.	The Juniper Webworm	H. Andison
12.	The Crumena of the *Coccidae* and the *Adelges*	A. D. Heriot
13.	Ectoparasites of Mammals in British Columbia	G. J. Spencer
14.	The Seasonal History of *Halisidota argentata* Pack.	W. G. Mathers
15.	An Interesting Winter Dipteron	J. K. Jacob
16.	The Termite Situation in British Columbia	G. J. Spencer
17.	The Life History and Habits of *Necrobia rufipes* de Geer	H. F. Olds
18.	An Orthopterous Pest of Apples in the Interior of British Columbia	A. A. Dennys
19.	Insects, or near Relatives of Economic Importance Recently Notes in British Columbia	G. R. Hopping

Particularly outstanding were those papers presented by Mr. Gregson, Mr. Getzendaner, and the one on Ectoparasites of Mammals by Professor Spencer. Mr. Getzendaner's paper was nicely illustrated with lantern slides.

In the evening an informal dinner was held at the Grosvenor Hotel. It was there decided that in addition to this dinner there should be a luncheon where the members would gather on the day of the meeting. The Secretary was therefore instructed to make arrangements for this

Mailed Saturday, April 4th, 1936.